

What is claimed is:

1. A method for dynamically adjusting reserved bandwidth in a data communications device
5 while transporting a session of data communication within the device, the method comprising the steps of:

establishing a first bandwidth reservation associated with a session of data communication in the data communications device;

transporting, through the data communication device, data associated with the session of data communication utilizing data storage locations associated with the first bandwidth reservation;

receiving bandwidth allocation adjustment information during the session of data communication; and

dynamically adjusting the first bandwidth reservation to produce a second bandwidth reservation for the session of data communication in accordance with the bandwidth allocation adjustment information while continually maintaining the session of data communication.

2. The method of claim 1 wherein the step of establishing a first bandwidth reservation includes the steps of:

accepting a first bandwidth reservation request indicating a first amount of bandwidth to reserve for the session of data communication in the data communications device; and

labeling, with an identity of the session of data communication, a first percentage of available data storage locations used to store data transported through the data communications device thus establishing the first bandwidth reservation, wherein the first percentage of storage
25 locations labeled is based upon the first amount of bandwidth requested as indicated in the first bandwidth reservation request.

3. The method of claim 2 wherein, after the step of accepting a first bandwidth reservation request, the step of establishing a first bandwidth reservation further includes the step of:

calculating and storing a first percentage of total device bandwidth to allocate to the session of data communication based upon the first bandwidth reservation request; and

wherein the first percentage of data storage locations labeled in the step of labeling is based upon the calculated first percentage of total device bandwidth to allocate to the session of data communication.

5 4. The method of claim 3 wherein the step of calculating and storing, stores the calculated first percentage in a resource allocation table which is independently accessible by the step of labeling and the step of dynamically adjusting, so as to allow the step of dynamically adjusting to alter the calculated percentage in the resource allocation table without disrupting the step of labeling, thus allowing the bandwidth reservation in the device to be adjusted without effecting
10 operation of the step of transporting.

15 5. The method of claim 2 wherein the step of dynamically adjusting the first bandwidth reservation to produce a second bandwidth reservation includes the steps of:

accepting a second bandwidth reservation request indicating a second amount of bandwidth to reserve for the session of data communication;

20 labeling, with an identity of the session of data communication, a second percentage of available data storage locations used to store data transported through the data communications device thus establishing the second bandwidth reservation, wherein the second percentage of storage locations labeled is based upon the second amount of bandwidth requested as indicated in the second bandwidth reservation request; and

wherein the second percentage of storage locations labeled is different than the first percentage of storage locations labeled.

25 6. The method of claim 5 wherein, after the step of dynamically adjusting the first bandwidth reservation to produce a second bandwidth reservation further includes the step of:

calculating and storing a second percentage of total device bandwidth to allocate to the session of data communication based upon the second bandwidth reservation request; and

30 wherein the second percentage of data storage locations labeled in the step of labeling is based upon the calculated second percentage of total device bandwidth to allocate to the session of data communication.

7. The method of claim 6, wherein the step of calculating and storing, stores the calculated second percentage in a resource allocation table as a replacement for the calculated first percentage; and

wherein the resource allocation table is independently accessible by the step of labeling
5 and the step of dynamically adjusting, so as to allow the step of dynamically adjusting to alter the calculated first percentage in the resource allocation table without disrupting the step of labeling, thus allowing the first bandwidth reservation in the device to be adjusted without effecting operation of the step of transporting.

10 8. The method of claim 2 wherein the step of calculating includes the steps of:

obtaining a current measurement of data communications device data storage locations available for data storage and a current bandwidth utilization rate; and

computing an amount of bandwidth to reserve for the session of data communication based on the current bandwidth utilization rate and on the current measurement of data communication device data storage locations available for data storage.

9. The method of claim 1 wherein the step of dynamically adjusting the first bandwidth reservation to produce a second bandwidth reservation includes the steps of:

accepting a bandwidth reservation request indicating a specific amount of bandwidth to reserve for the session of data communication;

calculating and storing a percentage of total device bandwidth to allocate to the session of data communication based upon the bandwidth reservation request; and

labeling, with an identity of the session of data communication, a percentage of available data communication device data storage locations used to store data transported through the data communications device, wherein the percentage labeled is based upon the calculated percentage of total device bandwidth to allocate to the session of data communication.

10. The method of claim 9 wherein the step of calculating and storing, stores the calculated percentage in a resource allocation table which is independently accessible by the step of labeling, so as to allow the step of dynamically adjusting to alter the calculated percentage in the

resource allocation table without disrupting the step of labeling, thus producing the second bandwidth reservation in the device without effecting operation of the step of transporting.

11. The method of claim 1 wherein the step of transporting deposits the data associated with the session of data communication into data storage locations having an identification associated with the session of data communication and does so independently of how the identification associated with the session of data communication is created.

12. The method of claim 11 wherein the step of transporting deposits the data associated with the session of data communication only into data storage locations having an identification associated with the session of data communication.

13. The method of claim 1 wherein the data communications device uses an RSVP protocol to determine an amount of bandwidth to reserve.

14. A method for dynamically reserving bandwidth in a data communications device comprising the steps of:

accepting a first bandwidth reservation request indicating a first amount of bandwidth to reserve for a session of data communication in the data communications device; and

labeling, with an identity of the session of data communication, a percentage of available data storage locations used to store data transported through the data communications device to establish a first bandwidth reservation, wherein the percentage of storage locations labeled is based upon the first amount of bandwidth requested as indicated in the first bandwidth reservation request.

15. The method of claim 14, further comprising the steps of:

accepting a second bandwidth reservation request indicating a second amount of bandwidth to reserve for the session of data communication;

labeling, with an identity of the session of data communication, a second percentage of available data storage locations used to store data transported through the data communications device thus establishing a second bandwidth reservation which replaces the first bandwidth

reservation associated with the session of data communications, wherein the second percentage of storage locations labeled is based upon the second amount of bandwidth requested as indicated in the second bandwidth reservation request; and

wherein the second percentage of storage locations labeled is different than the first
5 percentage of storage locations labeled.

16. The method of claim 14 wherein the step of labeling is performed periodically to maintain a correct amount of reserved bandwidth for the session of data communication without disturbing the session of data communication.

17. The method of claim 14 wherein the step of labeling is performed in response to receipt of a bandwidth reservation request.

18. The method of claim 14 wherein the step of labeling labels the data storage locations with more than one identify of more than one session of data communication.

19. The method of claim 14 wherein the step of labeling labels the data storage locations with preemptable labels that indicate that the storage location can be used for storing data other than data associated with the session of data communication for which the storage location is labeled.

20. A method for separately handling bandwidth reservation processing in a data communications device from data transport processing, the method comprising the steps of:
processing requests to reserve bandwidth for a session of data communications and
labeling a percentage of available data storage locations in the data communications device with
a session identifier; and

concurrently processing and transporting data through a data communications device using the available data storage locations to store the data as it is processed, and depositing only data having a corresponding identifier equivalent to the session identifier of the storage locations into the data storage locations labeled with the session identifier.

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C1/ 21. The method of claim 20, wherein the step of processing requests processes requests to change an amount of reserved bandwidth associated with the session of data communication

22. A method for storing bandwidth reservation information, the method comprising the steps
5 of:

accepting a bandwidth reservation request indicating an amount of bandwidth to reserve for a session of data communication;

calculating a percentage of total device bandwidth to allocate to the session of data communication based upon the bandwidth reservation request; and

10 storing the percentage in a resource allocation table which is independently accessible by a flow labeler.

23. A data communications device capable of dynamically adjusting reserved bandwidth while maintaining a session of data communication, the device comprising:

an input for receiving data including bandwidth reservation requests;

AS a data storage mechanism including data storage locations;

a bandwidth reservation processor coupled to the input port and accepting a first bandwidth reservation request indicating a first amount of bandwidth to reserve for the session of data communication in the data communications device, the bandwidth reservation processor establishing a first bandwidth reservation associated with a session of data communication in the data storage locations; and

20 a data scheduler coupled to the input port and coupled to the data storage mechanism, the data scheduler receiving data associated with the session of data communication and depositing the data associated with the session of data communication into the data storage locations
25 associated with the first bandwidth reservation.

24. The data communications device of claim 23 wherein the bandwidth reservation processor receives bandwidth allocation adjustment information from the input port during the session of data communication and dynamically adjusts the first bandwidth reservation in the data storage
30 locations to produce a second bandwidth reservation for the session of data communication in accordance with the bandwidth allocation adjustment information while the data scheduler

continually receives and deposits data associated with the session of data communication into the data storage locations associated with the session of data communication.

25. The data communications device of claim 23 wherein the bandwidth reservation processor
5 includes:

a bandwidth request handler coupled to the input port to receive the bandwidth reservation request; and

a bandwidth labeler coupled to the bandwidth request handler and coupled to the data storage locations, the bandwidth labeler receiving bandwidth allocation information indicated in
10 the first bandwidth reservation request and labeling, with an identity of the session of data communication, a first available percentage of the data storage locations used to store data transported through the data communications device thus establishing the first bandwidth reservation.

26. The data communications device of claim 25 wherein the bandwidth reservation processor further includes:

a resource allocation table accessible by the bandwidth labeler; and
a resource allocation calculator coupled to access the resource allocation table independently of the bandwidth labeler, the resource allocation calculator receiving the bandwidth allocation information indicated in the first bandwidth reservation request and calculating and storing in the resource allocation table a first percentage of total device bandwidth to allocate to the session of data communication based upon the first bandwidth reservation request.

27. A system for reserving bandwidth in a data communications device comprising:

a bandwidth request handler accepting a first bandwidth reservation request indicating a first amount of bandwidth to reserve for a session of data communication in the data communications device; and

a bandwidth labeler coupled to the bandwidth request handler, the bandwidth labeler labeling, with an identity of the session of data communication, a percentage of available data storage locations used to store data transported through the data communications device to

establish a first bandwidth reservation, wherein the percentage of storage locations labeled is based upon the first amount of bandwidth requested as indicated in the first bandwidth reservation request.

5 28. A data communications device comprising:

a bandwidth reservation processor processing requests to reserve bandwidth for a session of data communications and labeling a percentage of available data storage locations in the data communications device with a session identifier; and

10 a data transporter concurrently processing and transporting data through a data communications device using the available data storage locations to store data as it is processed, the data transporter depositing only data having a corresponding identifier equivalent to the session identifier of the storage locations into the data storage locations labeled with the session identifier.

29. A computer program product having a computer-readable medium including computer program logic encoded thereon for allocating bandwidth in a data communications device, such that the computer program logic, when executed on at least one processing unit with the data communications device, causes the at least one processing unit to perform the steps of:

20 establishing a first bandwidth reservation associated with a session of data communication in the data communications device;

transporting, through the data communication device, data associated with the session of data communication utilizing data storage locations associated with the first bandwidth reservation;

25 receiving bandwidth allocation adjustment information during the session of data communication; and

dynamically adjusting the first bandwidth reservation to produce a second bandwidth reservation for the session of data communication in accordance with the bandwidth allocation adjustment information while continually maintaining the session of data communication.

30. The computer program product of claim 29 wherein the computer program logic that executes the step of establishing a first bandwidth reservation further causes the at least one processing unit to perform the steps of:

accepting a first bandwidth reservation request indicating a first amount of bandwidth to reserve for the session of data communication in the data communications device; and

labeling, with an identity of the session of data communication, a first percentage of available data storage locations used to store data transported through the data communications device thus establishing the first bandwidth reservation, wherein the first percentage of storage locations labeled is based upon the first amount of bandwidth requested as indicated in the first bandwidth reservation request.

31. The computer program product of claim 29 wherein the computer program logic that executes the step of dynamically adjusting the first bandwidth reservation to produce a second bandwidth reservation further causes the at least one processing unit to perform the steps of:

accepting a second bandwidth reservation request indicating a second amount of bandwidth to reserve for the session of data communication;

labeling, with an identity of the session of data communication, a second percentage of available data storage locations used to store data transported through the data communications device thus establishing the second bandwidth reservation, wherein the second percentage of storage locations labeled is based upon the second amount of bandwidth requested as indicated in the second bandwidth reservation request; and

wherein the second percentage of storage locations labeled is different than the first percentage of storage locations labeled.

32. A computer readable medium encoded with a data structure, the data structure storing bandwidth allocation information, the bandwidth allocation information including an identity of at least one session of data communication and a number representing a percentage of data storage locations to associate with the identity of the at least one session of data communication.

33. The computer readable medium of claim 32 wherein the number representing a percentage of data storage locations to associate with the identity of the at least one session of data

communication.

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